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In the Supreme Court of the United States

OCTOBER TERM, 1976

76-1559

C. MARSHALL DANN, COMMISSIONER OF PATENTS AND TRADEMARKS, PETITIONER

v.

GLEN F. CHATFIELD

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

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The Solicitor General, on behalf of the Commissioner of Patents and Trademarks, petitions for a writ of certiorari to review the judgment of the United States Court of Customs and Patent Appeals in this case.[1]

OPINIONS BELOW

The opinion of the Court of Customs and Patent Appeals (App. A, *infra*, pp. 1A–21A) is reported at 545 F. 2d 152. The opinion of the Patent and Trademark

[1] The Solicitor General is concurrently seeking review of *Application of Noll*, 545 F. 2d 141, a companion decision of the Court of Customs and Patent Appeals concerning the patentability of computer programs.

Office Board of Appeals (App. C, *infra*, pp. 23A–27A) is not reported.

JURISDICTION

The judgment of the Court of Customs and Patent Appeals (App. B, *infra*, p. 23A) was certified to the Commissioner of Patents on December 10, 1976. On March 8, 1977, the Chief Justice extended the time for filing a petition for a writ of certiorari to May 9, 1977, without prejudice to the Court's consideration of whether the government's application was timely filed.[2] The jurisdiction of this Court is invoked

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[2] The time for petitioning for review of the judgment should be computed from December 10, 1976. Under the practice of the Court of Customs and Patent Appeals, the only judgment issued by that court is its mandate. The court's opinion, entered November 18, 1976, is not entered on the court's docket as a judgment. The mandate, issued on December 10, 1976, implements the decision and constitutes the judgment of the court, in accordance with 35 U.S.C. 144, which provides: "the court shall return to the Commissioner [of Patents] a certificate of its proceedings and decision, which shall be entered of record in the Patent Office and govern the further proceedings in the case." The clerk's office of the Court of Customs and Patent Appeals has advised us that mandates are not prepared at the time the court's decision is announced, but only shortly before the mandates are issued. Moreover, when this Court reverses a judgment of the Court of Customs and Patent Appeals, that court does not, upon remand, withdraw its decision as if it were a judgment. Instead it simply issues a new mandate in conformity with this Court's determination. See *In the Matter of the Application of Thomas R. Johnston*, CCPA Patent Appeal No. 9088, mandate issued April 29, 1976, pursuant to *Dann* v. *Johnston*, 425 U.S. 219. While the former rules of the Court of Customs and Patent Appeals governing issuance of the mandate and petition for rehearing referred to the "entry of judg-

under 28 U.S.C. 1256. *Gottschalk* v. *Benson*, 409 U.S. 63; *Dann* v. *Johnston*, 425 U.S. 219.

QUESTIONS PRESENTED

1. Whether the subject matter patentable under 35 U.S.C. 101 includes a process for programming a conventional general-purpose digital computer.

2. Whether such a process is patentable under 35 U.S.C. 101, when:

(a) the claims' only limitation as to end use and apparatus is that the program is for data-processing use with the equipment conventionally used in a multiprogramming computer system;

(b) the applicant's sole inventive contribution, if any, over the prior art is the underlying concept of periodically analyzing the utilization of the computer's resources and allocating them among competing uses; and

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ment" (CCPA Rule 6.1), and to "date of judgment" (CCPA Rule 6.2), this language, inconsistent with the court's actual practice, was deleted from the rules effective January 1, 1977, to substitute the word "decision" for "judgment" in those provisions. For purposes of determining the date of judgment, therefore, this case is analogous to *Commissioner* v. *Estate of Bedford*, 325 U.S. 283, 284–288, which held that in the light of then actual practice in the Second Circuit, time to petition for a writ of certiorari ran from the date of that court's "order for mandate", rather than from the date of the opinion recorded on the docket. Although certain language in the Second Circuit's rules concerning rehearing, issuance of mandate and stay of mandate permitted the argument that the decision was the appealable judgment, this Court held that "[i]n spite of its title, the 'Order for Mandate' on its face fulfills the function of such a judgment order." 325 U.S. at 286.

(c) the programming implements the applicant's only inventive contribution, if any, in a conventional manner.

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

Article I, Section 8, clause 8, of the Constitution of the United States provides:

> The Congress shall have Power * * *
>
> * * * * *
>
> To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries * * *.

35 U.S.C. 101 provides:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

STATEMENT

Respondent applied (R. 5)[1] for a patent on a "Method of Operating a Multiprogrammed Computing System." The method consists of a program for operating a general-purpose digital computer so that the "resources" of the computer are allocated among alternative (or "competing") users, on the basis of periodic evaluation of the relative needs of the competing users. Although it is an old practice to use

[1] "R." refers to the printed record filed in the Court of Customs and Patent Appeals.

an internal, built-in computer program to "direct traffic" (i.e., allocate resources) in a computer, respondent's method adds the concept of periodically evaluating prior "traffic patterns" in order to modify the traffic-directing control program to conform with then-current usage and demand in the computer (R. 6, 9–10).

A general-purpose digital computing system—such as the IBM System/360/370 in which respondent's method is designed to operate (R. 13)—generally includes two types of "resources": (1) a central data processing unit, which contains a main memory and performs arithmetical and logical operations to process data; and (2) peripheral units serving input-output functions (*e.g.*, card-readers, printers, tape drives). In the present state of technology, particular input-output units take much longer to convert data to and from the form usable by the central processing unit than the central processing unit takes to process that data.[4] Hence, these peripheral unit resources are often insufficient (at least in the quantity in which they can be economically furnished) to satisfy the needs of all the programs that are in the system at any one time (R. 6). A "multiprogramming" system increases the degree of utilization of the resources of the entire computer system, by "processing" one or more programs in the central processing unit while

[4] Awad and Data Processing Management Association, *Automatic Data Processing: Principles and Procedures* 222, 301 (2d ed. 1970). For a concise general description of computer operating systems, see *id.* at 301–303.

other programs utilize the peripheral units, so that overall utilization of the units is maximized and unutilized capacity kept to a minimum. Some method of allocating the competing programs' access to the units (*i.e.*, setting priorities) is thus required in any multiprogramming system.

Previous methods for regulating access to the computer's resources in a multiprogramming system assigned a fixed or static priority of access to each competing program (R. 7).[5] Respondent's method instead first accumulates computer-resource use-data for a time interval (in the so-called "data gathering" portion of the program, R. 16–23), and then periodically interrupts the data processing operation, by conventional means (R. 13, 15), to analyze the accumulated data, then regulates further access to the central processing and peripheral units on the basis of the latest such analysis (in the so-called "regulating" portion of the program) (R. 15, 23). Respondent's method thus differs from prior allocation methods in "dynamically" regulating access priority to the central processing unit, on the basis of changing usage and demand patterns.[6]

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[5] A familiar non-computer example of static access priority occurs when a secretary is told always to answer the red telephone ("hot line") first when several lines ring at once.

[6] Respondent's claimed method is analogous to a police officer's control of traffic at an intersection. Traffic control lights generally assign a fixed priority of access to cross traffic at an intersection. A police officer accumulates system utilization data

The respondent's patent application recites five separate embodiments of the regulating portion of the program (R. 23–42), which all use the same data as to prior system resource utilization, but which assign priorities to the competing programs according to differing mathematical models or formulas.[7] The various embodiments are designed to optimize different

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by noting that traffic is light on one cross street and heavy on the other, and then may regulate the intersection by giving priority to the traffic on one street over that on the other — *e.g.*, by periodically stopping the heavy traffic long enough only to allow the accumulation of light traffic to pass through the intersection.

[7] Claim 3 (R. 44, 118–119) is illustrative. It covers a method of operating a general-purpose digital computer by "multiprogramming" pursuant to these steps:

(1) Accumulate data as to system utilization by resources;

(2) Stop, analyze the data, and regulate access to resources in accordance with the following formula for determining access priority to the central processing unit ("CPU"):

(a) When CPU activity is greater than peripheral unit activity,

$$\text{CPU priority} = \frac{\sum_{i=1}^{n} (\text{peripheral activity})_i}{\text{CPU activity}},$$

when n = number of peripheral units used, $(\text{peripheral activity})_i$ = the activity of the ith peripheral resource, CPU activity = the activity of the CPU, and Σ means the sum of each of the values of (peripheral activity) from $i = 1$ to $i = n$.

(b) When CPU activity is less than peripheral unit activity,

$$\text{CPU priority} = n + \frac{\text{maximum peripheral activity}}{\text{total resource activity}};$$

(3) Resume processing and repeat the foregoing.

characteristics of the overall computing system (R. 40). The first two embodiments concern algorithms that assign priorities for access to a component according to a principle known as "inverse need basis" (R. 10). This "inverse need" principle dictates simply that programs with only relatively infrequent needs for the peripheral resources are assigned a high priority for their use and, similarly, programs with only relatively infrequent needs for the central processing unit are assigned a high priority for its use.[8] The result is increased efficiency in the utilization of both the peripheral and the central processing units (R. 23–24).

The third embodiment of the program utilizes the conventional technique of linear programming[9] to develop an algorithm that assigns priorities (R. 31). According to the patent application, this algorithm, like the first two embodiments, is aimed at maximizing the system's overall efficiency, but it is more effective in systems in which a large number of programs compete for a small number of resources (*ibid.*).[10]

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[8] See, *e.g.*, claim 3, n. 7, *supra*, p. 7. See also n. 6, *supra*, p. 6, for a non-computer example of utilization of the inverse need principle.

[9] Specifically, the patent application states that the embodiment "uses a special form of the general linear programming model." The application describes linear programming as "an established technique for maximizing a linear function" (R. 31).

[10] In this embodiment, the program selects the subset of competing programs ($x_1, x_2 \ldots x_n$) that maximizes the linear function $Z = PF_1x_1 + PF_2x_2 + \ldots PF_nx_n$, where there are n pro-

The fourth embodiment emphasizes the efficiency of the individual program user; it seeks to minimize waiting-time (the time a program waits for processing) by interrupting the processing of so-called "hog" programs (R. 36–40).[11]

The final embodiment simply alternates between a regulating algorithm that maximizes overall system efficiency, and one that minimizes waiting-time, to meet the varying load requirements of the computer system (R. 40–41).

Respondent attached a basic version of the actual computer instructions for carrying out the data-gathering algorithm and several of the regulating embodiments of respondent's method as Appendix A to the patent application, to illustrate the description of respondent's method (see R. 18).[12] Respondent has made no claim that this implementation, which is a commercially available system called "QCM" (Quanti-

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grams executing in parallel and each *PF* is the "program productivity factor" for one of the competing programs. See R. 31–36, 121.

[11] Referring again to the traffic control analogy presented *supra* at n. 6, *supra*, p. 6, a police officer following this principle would have to interrupt a funeral procession whenever any individual car on the cross street had waited for it for more than a certain period of time.

[12] Appendix A was not, however, included in the printed record in the court below. The Board of Appeals of the Patent and Trademark Office characterized the listing in Appendix A as a "basic version" of respondent's program (R. 113–114, App. C, *infra*, p. 24A).

tative Computer Management) (R. 18), is novel or inventive.

Respondent claimed the various embodiments based on different mathematical models described above and also (in claim 1) the general method of periodically reevaluating computer utilization data in order to assign, to competing programs, priorities for access to the computer's resources. The patent examiner rejected all of respondent's claims as unpatentable under 35 U.S.C. 101 (R. 103, 106), and respondent appealed to the Board of Appeals of the Patent and Trademark Office (the "Board"). The Board found that "[t]he invention before us, as was the invention before the Court in [*Gottschalk* v.] *Benson,* [409 U.S. 63], is a method of programming a general purpose computer * * * not patentable under 35 U.S.C. 101" (App. C, *infra*, p. 27A, R. 116). It rejected repondent's contention that his claims are patentable because limited to a particular apparatus and a particular end use, because both the apparatus (a general-purpose computer) and the end use (data-processing) are the same as those held insufficient in *Benson, supra* (App. C, *infra*, pp. 25A–26A; R. 114–115). The Board therefore affirmed the examiner's decision.

The Court of Customs and Patent Appeals reversed, 3-to-2, holding that *Benson* does not extend generally to computer programs (App. A, *infra,* pp. 6A–9A). It viewed the holding in *Benson* to be limited to the proposition "that solving an equation constituted non-statutory subject matter"

(*id.* at 13A). The court below concluded that, even though respondent's claims do contain mathematical formulas, the claims, when "analyzed as a whole, simply define a novel method for operating a particular machine system in a particular mode" (*id.* at 14A), and it therefore held respondent's method to be outside the scope of *Benson*. Judge Rich, joined by Judge Lane, dissented from the majority's "narrower view of *Benson*" (*id.* at 21A).[13]

REASONS FOR GRANTING THE WRIT

The Court of Customs and Patent Appeals, by ordering that patents issue for the instant computer program and for the program involved in the com-

[13] Judge Rich concluded his dissent in this case with a plea—joined by the majority in a footnote to its opinion (App. A, *infra*, n. 6, p. 10A)—for this Court's resolution of the issue of computer program patentability (App. A, *infra*, p. 21A):

"My colleagues of the majority take a narrower view of *Benson* and arrive at an opposite result * * *. This, to me signals an urgent need to settle the question of patent protection for software by higher authority than this court so that the Patent and Trademark Office, the Federal judiciary as a whole, and the data-processing industry (hardware and software both) may know what the law on software patentability is. It is a socioeconomic issue with an impact of considerable magnitude, particularly on the practical operation of the Patent and Trademark Office. It is obviously not going to be finally decided in this court. Two Commissioners (Gottschalk and Dann) have obtained review of our decisions in the Supreme Court and in both instances (*Benson* and *Johnston*) obtained reversals; but here we are in two more cases, three-to-two, reversing findings by the Office that program inventions are non-statutory under § 101. It seems to me like taking the problem of school segregation to court on a case-by-case basis, one school at a time."

panion case of *Application of Noll*, 545 F. 2d 141,[14] has continued, as it did previously in *Application of Johnston*, 502 F. 2d 765 (C.C.P.A.), reversed *sub. nom. Dann* v. *Johnston*, 425 U.S. 219, to refuse to follow the rationale of *Benson*. This policy has created uncertainty and confusion in the administration of the patent laws and will effectively withdraw from the public domain computer programming techniques that are "the basic tools of scientific and technological work" (*Benson, supra*, 409 U.S. at 67). If the decision of the court below stand, substantial numbers of (in our view, invalid) patents on computer programs will issue, resulting in expensive and time-consuming patent litigation throughout the country and serious economic impact in all areas of the economy touched by computers and computer use.[15]

As in *Benson*, the respondent's patent claims are solely for "methods" (and not "machines"). Thus, the only issue presented here is whether the presently-

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[14] See note 1, *supra* p. 1. The two cases present the same underlying issue—whether and in what circumstances patent monopolies should be granted over computer programs. If the petitions are granted, the cases should be consolidated for argument. Rule 43(5) of this Court's Rules.

[15] The 1975 $1.5 billion receipts volume for the software industry (which does not even include the volume in software that large, integrated computer manufacturers develop as an auxiliary to their hardware systems) provides an indication of the economic magnitude of the issue. United States Department of Commerce, *U.S. Service Industries in World Markets: Current Problems and Future Policy Development* A-90, A-96 (December 1976). See also n. 25, *infra*, p. 18.

claimed computer-programming method is distinguishable from Benson's method in some way that makes it patentable. We submit that it is not; like Benson's, respondent's computer-programming method fails to satisfy the statutory standards for patentable inventions.

An idea or abstraction—even if it is an important advance in human thought or, indeed, a flash of genius—has never come within the class of subject matter that may be patented. To avoid monopolizing an idea, the patent statute permits a patent to be issued only to one who "invents or discovers" subject matter that comes within one of four concrete statutory classes: machines, articles of manufacture, compositions of matter, and processes (or methods) for making or using one of the foregoing (35 U.S.C. 101).

This statute represents Congress's implementation of the Patent Clause (Article I, Section 8), which authorizes the issuance of patents to inventors for their discoveries, but only to "promote the Progress of Science and useful Arts."[16] Congress concluded that issuing patents on abstract intellectual concepts, mathematical or scientific principles, phenomena of nature, and the like, would, on balance, impede that progress more than promote it, because granting such monopolies would deny the public the benefit of the

[16] See *Graham* v. *John Deere Co.*, 383 U.S. 1, 5.

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basic currency of scientific and technological development.[17] Similarly, business ideas (apart from their tangible applications) are unpatentable, because patents on innovative methods of transacting business would be as destructive to competitive commercial progress as patents on scientific ideas would be destructive to scientific progress.[18] A corollary of this rule is that, if the claims of a patent are so broad and sweeping as to cover virtually all existing and potential applications of an idea or principle, granting the patent may be tantamount to patenting the idea or principle itself, and therefore impermissible.[19]

Under the statutory language,[20] while an abstract idea is unpatentable, a concrete embodiment of the idea into one of the four statutory classes of subject

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[17] See *Benson*, *supra*, 409 U.S. at 67.

[18] See, *e.g.*, *Joseph E. Seagram & Sons, Inc.* v. *Marzall*, 180 F. 2d 26, 28 (C.A.D.C.) (method of testing consumer product preferences).

[19] *Benson*, *supra*, 409 U.S. at 68–72. See also *O'Reilly* v. *Morse* (the *Telegraph case*), 15 How. 62; *The Telephone Cases*, 126 U.S. 1, 534.

[20] The particular language involved here dates from the Patent Act of 1790, Section 1, 1 Stat. 109:

"That upon the petition of any person or persons * * * that he, she, or they, hath or have invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein * * * it shall and may be lawful to * * * cause letters patent to be made out * * *."

The term "process" was substituted for "art" in the 1952 Code. See 35 U.S.C. 100(b) ("process" means "art").

matter can be patentable, if it applies the underlying idea in a novel and inventive manner to a specific use in a specific art or field of technology.

Respondent in the instant case claims a new process or method of using an existing machine, the general-purpose digital computer, to improve its efficiency in performing its ordinary tasks.[21] In previous cases involving methods, as this Court observed in *Benson*, 409 U.S. at 68–71, the courts have used several tests or requirements to protect against the danger of pre-emption of the underlying idea. Unless the requisite concreteness was supplied because the process was one for transforming one physical substance into another (*e.g.*, fat into glycerine, or gum rubber into vulcanized rubber), the courts have closely scrutinized the claimed methods to determine whether they are for a particular end use in a particular art or technology, and whether they are carried out with specific apparatus devised for such a purpose. Cf. *Benson, supra*, 409 U.S. at 64. Applying this test ("the clue to the patentability of a process claim that does not include particular machines," *id.* at 70), this Court held Benson's computer-program method for converting numerical information or signals in binary-coded decimal (BCD) form into numerical information or

[21] 35 U.S.C. 100(b) defines "process" as follows:

"The term 'process' means process, art or method, and includes a new use of a known • • • machine • • •."

signals in pure binary form to be unpatentable, because it was so abstract an application of the mathematical concept, and so sweeping a claim, as to preempt the very idea underlying the transformation from BCD to binary numerical form.

Respondent's claims are squarely within the rationale of *Benson*. Like Benson's idea, respondent's idea is embodied in computer programming, an algorithm translatable into a set of instructions that the computer can perform. To be sure, the idea is "limited" to application for a particular end use (the operation of digital computers to perform data processing), as the court below noted (App. A, *infra*, p. 15A).[22] But that is no more meaningful a limitation than if a claim for the method of performing long-division were limited to application in doing mathematics, or if a claim for the idea of operating a drive-in movie theatre were limited to application in outdoor entertainment enterprises, or if a claim for the idea of operating a cafeteria were limited to use in food-selling establishments.[23] Such a "limitation" is without practical significance, because, like the mathematical concept

[22] Claim 8 in *Benson* was limited to data-processing apparatus having a "reentrant shift register," while claim 13 covered a "data processing method." See 409 U.S. at 73–74.

[23] Indeed, respondent's claims are for, or are analogous to claims for, a method of doing business—the substantial and grow-

involved in *Benson*, respondent's idea of periodically re-evaluating access priorities in a multiprogramming system "has no substantial practical application except in connection with a digital computer" (*Benson, supra*, 409 U.S. at 71).

Indeed, respondent's claims are so "abstract and sweeping" (*id.* at 68) that like Benson's they preempt every possible application of the idea they embody. Any multiprogramming system in which usage data is collected to provide the basis for a periodic adjustment of access priorities—according to any regulating principle designed to maximize efficiency in any manner—would infringe at least claim 1 of the patent

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ing business of operating computing systems servicing multiple users. See n. 25; *infra*, p. 18. The program is part of the overall operating system of the computer, and its purpose is to direct the efficient access by the users to the computer resources. But business ideas or procedures, like the idea of the cafeteria or the drive-in movie, have long been held to be in the same class of unpatentable subject matter as scientific or mathematical ones, and for the same reasons. *E.g.*, *Joseph E. Seagram & Sons, Inc.* v. *Marzall*, *supra*, 180 F. 2d at 28 (C.A.D.C.) (denying patent on method of testing consumer product preferences); *Loew's Drive-In Theatres, Inc.* v. *Park-In Theatres, Inc.*, 174 F. 2d 547, 552 (C.A. 1), certiorari denied, 338 U.S. 822: "[A] system for the transaction of business, such, for example, as the cafeteria system for transacting the restaurant business, or similarly the open-air drive-in system for conducting the motion picture theatre business, however novel, useful, or commercially successful is not patentable apart from the means for making the system practically useful, or carrying it out".

that respondent seeks.[24] Under so sweeping a patent grant, none of the access-management problems that arise whenever two or more users share a computer system could be periodically reevaluated and then addressed without fear of infringement of respondent's patent. Award of a patent monopoly to respondent on his programming idea would therefore have a direct, preemptive economic impact on all computer facilities that have any multiprogramming capabilities.[25]

Even if the court below were correct in holding respondent's program to be distinguishably less ab-

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[24] The Court of Customs and Patent Appeals specifically stated that respondent's claims could cover numerous other mathematical formulas or algorithms in addition to those specifically disclosed in the application (App. A, *infra*, p. 14a). In determining patentability during a proceeding before the Office, claims are given the broadest construction possible. See *e.g.*, *In re Pearson*, 494 F. 2d 1399, 1404 (C.C.P.A.); *Application of Wiggins*, 488 F. 2d 538, 541–542 (C.C.P.A.). The applicant is always free then to narrow his claims and make them more specific, in order to avoid a rejection.

The instant patent application appears to contemplate precisely the result perceived by the court below. The specification asserts that the "invention" is a program to gather data and assign priorities "to provide a dynamically regulated resource access method" (R. 10).

Each claim (other than claim 1) claims only those regulating principles it mentions, but each also covers all uses of its particular regulating principle (*e.g.*, inverse need, or interruption of "hog" programs).

[25] In 1972 there were almost 4000 United States establishments providing data-processing services, with total sales of $1.9 billion; it is estimated that sales of data-processing services increased to $3 billion by 1975. *U.S. Service Industries In World Markets: Current Problems and Future Policy Development*, *supra*, at A–98.

stract than Benson's, the programming method nevertheless falls significantly short of the inventive standard it must meet to constitute the kind of subject matter that may properly be foreclosed, through the grant of a patent, from free and unrestricted public access and use. A second and further criterion (not met here) that the courts use to determine whether the application of an abstract idea is sufficiently removed from the underlying idea itself to be patentable subject matter, is whether the conception and devising of the new method (or product or machine) embodying the idea displays the inventive faculty.[26] The case law requires that the applicant's means of implementing the idea must extend beyond the routine, conventional, or obvious applications of the idea that follow once the patent applicant possesses the idea.[27] The standard that this Court applied under Section 103 (relating to obviousness) in *Sakraida* v. *Ag Pro, Inc.*, 425 U.S. 273, to evaluate the inventiveness of a combination of known elements of barn construction, has equal force here under Section 101. There, the Court refused to allow a patent to issue on a water flush system for removing cow

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[26] 35 U.S.C. 101 allows a grant only to one who "invents or discovers" a new machine, process, etc.

[27] See, *e.g.*, *Benson*, *supra*, 409 U.S. at 67–68; *Funk Brothers Seed Co.* v. *Kalo Inoculant Co.*, 333 U.S. 127, 130; *Armour Pharmaceutical Co.* v. *Richardson-Merrell, Inc.*, 396 F. 2d 70, 73–74 (C.A. 3); *National Lead Co.* v. *Western Lead Products Co.*, 324 F. 2d 539, 542 (C.A. 9); *Davison Chemical Corp.* v. *Joliet Chemicals, Inc.*, 179 F. 2d 793, 794–795 (C.A. 7), certiorari denied, 340 U.S. 816; *Loew's Drive-In Theatres, Inc.* v. *Park-In Theatres, Inc.*, *supra*, 174 F. 2d at 551–552.

manure from the floor of a dairy barn, stating (*id.* at 282):

> Exploitation of the principle of gravity adds nothing to the sum of useful knowledge where there is no change in the respective functions of the elements of the combination * * *.

See also *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co.*, 396 U.S. 57, 61; *Deepsouth Packing Co.* v. *Laitram Corp.*, 406 U.S. 518, 521–522.

Respondent's method claims fail this patentability test as well. The use of a computer program to control the overall operation of a multiprogramming system is admittedly old in the art (R. 6–9). Respondent claims as his inventive contribution the discovery or novel concept of periodic collection and evaluation of prior usage data as a basis for effecting such control. But once that concept was conceived, its implementation in the program controlling the operation of a multiprogramming system was entirely straightforward and conventional.[28] Respondent has not added any patentable implementation of this "discovery" in translating it into a computer program. He does not claim that his method "co-acts" with the old com-

[28] There is no claim that the actual programming instructions implementing respondent's concept are in any way novel or inventive. Indeed, although suggested programming for carrying out parts of respondent's method was appended to the patent application (see R. 18), much of the method was disclosed only in flow charts, presumably because the details could be worked out by a programmer of ordinary skill in the art. See, *e.g.*, R. 11–12; cf. R. 18–19 with R. 29–31. Even the suggested version of the program has to be modified pursuant to the flow charts to carry out respondent's claimed method, according to the Board (App. C, *infra*, p. 25A, R. 114).

puter to accomplish the kind of new and unconventional result that makes for invention; on the contrary, the program simply co-acts with an ordinary computer in an ordinary way. See *Anderson's-Black Rock, supra; Sakraida, supra.* It is no more than as if Pythagoras had translated the Pythagorean Theorem from Greek to some other language; such translation does not transubstantiate the idea into something more than the idea. To qualify as one that "invents or discovers any new and useful process" within the meaning of 35 U.S.C. 101, whoever translates an idea into a computer program or any other embodiment must produce more than an obvious application of the unpatentable idea. Respondent's application of the principle he discovered, *viz.,* that dynamic evaluation of resource usage results in more efficient resource allocation, "adds nothing to the sum of useful knowledge" (*Sakraida, supra,* 425 U.S. at 282) and is therefore not an invention of patentable subject matter.

Accordingly, the Court of Customs and Patent Appeals erred in allowing patent protection for respondent's ordinary, noninventive application of an abstract idea. A computer program implementation of even the most innovative programming idea is not an "invention" of a "new and useful process" under 35 U.S.C. 101 unless the implementation itself is inventive and is restricted to meaningful end-use and apparatus limitations. Any change in this standard, which derives from well-settled judicial interpreta-

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tion of the patent statute, existing substantially in the same form since its first enactment in 1790,[29] must come from Congress.

CONCLUSION

For the foregoing reasons, the petition for a writ of certiorari should be granted.

Respectfully submitted.

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MAY 1977.

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[29] See note 20, *supra*, at p. 14.

APPENDIX A

United States Court of Customs and Patent Appeals

APPLICATION OF GLEN F. CHATFIELD

PATENT APPEAL NO. 76-551

November 18, 1976

Before MACKEY, Chief Judge and RICH, BALDWIN, LANE, and MILLER, Associate Judges

MARKEY, *Chief Judge:* This is an appeal from the decision of the Patent and Trademark Office Board of Appeals affirming the rejection of claims 1–6 and 9–16 constituting all of the claims in appellant's application serial No. 243,951, filed April 14, 1972, entitled "Method of Operating a Multiprogrammed Computing System." We reverse.

THE INVENTION

Chatfield's invention resides in the field of computer technology and specifically in the area of multiprogrammed computer systems. Computer systems generally include one or more central processing units (CPU's) [1] and one or more peripheral units, e.g., input-output (I/O) devices, card readers, etc. In multiprogram systems, the CPU and the peripheral resource equipment may process more than one program concurrently. A problem arises when more than

[1] The central processing unit or units perform the main logic and memory functions for the system.

one program requires the use of the same piece of equipment at the same time.

Three earlier solutions of the problem had been employed. One physically builds priority levels into the CPU, so that one particular program will have priority over another particular program. A second solution assigns each program a priority. A disadvantage encountered in both is that once the program begins to run, the relative priority is fixed. The third solution specifically writes the programs to take advantage of the priority-assignment capabilities of the particular system used. The disadvantage there encountered is that specific programs must be written for each particular system. If the system is changed, the programs must be changed.

Chatfield's novel solution dynamically evaluates and reassigns program priorities as the programs execute. No prior art was cited against the appealed claims and, accordingly, Chatfield's invention must be considered to have been new and unobvious.

The method embraced by the appealed independent claims involves operating a computing machine system for an interval, and accumulating resource use data [2] for that operating interval. Periodically, the processing operation is halted and the use data are analyzed. That analysis determines the priorities, and consequent resource access, for the next period of operation. The processing operation is resumed for another period of time, use data accumulated, operation halted, data analyzed, priorities and access determined and as-

[2] The resource use data include resource activity data and data respecting degradation, i.e., the inefficiency resulting from more than one program competing for the same resource.

signed, and so on, repetitively. The net effect is an overall gain in operating efficiency, i.e., an increased "throughput."

The appealed dependent claims describe several variant mathematical algorithms useable in analyzing the resource use data and regulating resource access priority.

Independent claim 1, and dependent claims 2 and 3, are representative and are reproduced below:

1. A method of operating a computing system upon more than one processing program concurrently for improving total resource utilization, said computing system comprising at least one central processing unit, having a logic and main memory function and an interrupt capability, and a plurality of peripheral resources capable of functioning in parallel with the central processing unit, comprising steps for:

> "(1) accumulating system utilization data for at least one processing program for at least one resource, said system utilization data comprising resource activity and/or resource degradation data;
>
> "(2)(a) at spaced intervals interrupting the processing programs and analyzing the system utilization of at least one processing program;
>
> "(2)(b) based on this analysis regulating resource access by assigning an individual resource access priority and/or preventing resource access altogether in an unlike manner to at least two resources for at least one processing program to increase thruput;
>
> "(3) resuming the operation of the computing systems on the processing programs: and
>
> "(4) continually repeating steps (1) to (3)."

2. A method according to Claim 1 in which the regulation in step (2)(b) comprises regulating resource access substantially to favor the more overlapped programs, said overlapped programs being those that can use two or more resources in parallel.

3. A method according to Claim 2 in which processing program resource access regulated in step (2) is determined according to the following algorithm:

if CPU activity $\geq$ the Maximum Peripheral activity

$$\text{CPU PRIORITY} = \frac{\sum_{i=1}^{n} \text{PERIPHERAL ACTIVITY}_i}{\text{CPU ACTIVITY}}$$

where n is equal to the number of peripherals measured, where PERIPHERAL ACTIVITY is the activitiy of the ith peripheral resource, and where C.P.U. ACTIVITY is the activity of the C.P.U.

or if CPU activity $<$ the Maximum Peripheral activity

$$\text{CPU PRIORITY} = n + \frac{\text{MAXIMUM PERIPHERAL ACTIVITY}}{\text{TOTAL RESOURCE ACTIVITY}}$$

where n is equal to the number of peripherals measured, where MAXIMUM PERIPHERAL ACTIVITY is the total activity on the most active peripheral resource, and where TOTAL RESOURCE ACTIVITY is the sum of all C.P.U. and all peripheral resource activities, and all PERIPHERAL RESOURCE ACCESS PRIORITIES are assigned inversely to the CPU priorities.

The Board Opinion

The board took the position that the claims are drawn to non-statutory subject matter under the Supreme Court's decision in *Gottschalk* v. *Benson*, 409 U.S. 63, 93 S. Ct. 253, 34 L. Ed. 2d 273, 175

USPQ 673 (1972). In sustaining the examiner's rejection under 35 U.S.C. § 101, the board briefly reviewed our opinions in *In re Musgrave,* 57 CCPA 1352, 431 F. 2d 882, 167 USPQ 280 (1970), and *In re Benson,* 58 CCPA 1134, 441 F. 2d 682, 169 USPQ 548 (1971), on the question of non-statutory subject matter and concluded that the Supreme Court had "cast aside" the reasoning in those opinions. Although the examiner had referred to our opinion in *In re Christensen,* 478 F. 2d 1392, 178 USPQ 35 (CCPA 1973), in which this court affirmed the rejection in view of *Benson,* the board did not consider *Christensen* pertinent.

ARGUMENTS

Chatfield urges the Supreme Court in *Benson* foreclosed only the patentability of the particular program then before the court, not patentability of computer programs in general. Chatfield then argues that, unlike those in *Benson,* the instant claims (1) are not drawn solely to a mathematical formula or to an algorithm for solving that formula; and (2) are specifically drawn to a particular end use. His claims, Chatfield contends, are drawn to a new use of a known machine, i.e., to a patentable process as defined in 35 U.S.C. § 100(b).

The solicitor argues that the Supreme Court's reference in *Benson* to "these programs" must be construed as prohibiting the patentability of a "program" such as that presently claimed. The solicitor further urges that because the present claims include a mathematical formulation, and an algorithm for solving it, they are similar to those held to have been drawn to non-statutory subject matter in *Benson.* The solicitor

contends that the antecedent steps of the claims merely refer to gathering information preparatory to processing the algorithm and that the "end use" limitations depend upon the existence of other specific processing programs requiring priority assignment. In this respect, the solicitor's basic contention is that Chatfield's claims are no more limited than were the claims in *Benson*.

OPINION

Issue

Unlike the apparatus claims in *In re Noll* 545 F. 2d 141 (Cust. & Pat. App. 1976), decided this date, the appealed claims are drawn to a "method of operating a computing system." Although Chatfield's method of operating a computing machine system adjusts priorities of computer processing programs, no processing program, by itself, is claimed.

The claimed method operates to make the computing machine system more efficient in executing a plurality of processing programs. Any algorithm developed to be used in the claimed method would only guide the flow of the processing programs through the computing machine system and would not provide the informational input of the processing programs. Thus the issue is not whether a computer processing program, claimed in method terms, is statutory subject matter under 35 U.S.C. § 101.

Because nothing in the statute or in prior judicial opinions either authorizes or precludes patent protection of "computer programs," the mere labeling of an invention as "a computer program" does not aid in decision making. Of course we follow the Supreme

Court in our decisional process. In so doing, however, we take care not to unduly extend that Court's pronouncements beyond their expressed limits. The Supreme Court having expressly refused to extend its *Benson* holding to computer programs generally, 409 U.S. at 71, 93 S. Ct. 253, 175 USPQ at 676, we find no warrant for our doing so. In view of the Supreme Court's expression in *Benson* that the involved mathematical formula had "no substantial practical application except in connection with a digital computer," 409 U.S. at 71, 93 S. Ct. at 257, 175 USPQ at 676, the fundamental rationale we glean from *Benson* is that a patent containing Benson's claims would have preempted all practical use of both the underlying mathematical formula and the involved algorithm.[3]

The solicitor suggests that the Supreme Court, in its reference in *Benson* to the question of whether the patent laws should be extended to cover "these programs" [409 U.S. at 72, 93 S. Ct. 253, 175 USPQ at 676] and to the President's Commission on the Patent System, intended to include all computer programs within the phrase "these programs."[4] We do

[3] Though the Supreme Court stated in *Benson* that the process there involved could be performed without a computer or other apparatus, 409 U.S. at 67, 68, 93 S. Ct. 253, 175 USPQ at 675, it recognized that conversion to pure binary numerals was the only practical application of the formula and algorithm, and that binary numerals have their only practical application in connection with a digital computer, and thus that all practical uses of the formula and algorithm were in *effect* preempted by the claims. 409 U.S. at 71–72, 93 S. Ct. 253, 175 USPQ at 676.

[4] The dissenting opinion in *Noll* concludes that *Benson* stands for the proposition that computer programs are not statutory subject matter under section 101, basing its conclusion on language in *Benson* that "[i]f *these programs* are to be patentable, consider-

not agree. "It is a maxim, not to be disregarded, that general expressions, in every opinion, are to be taken in connection with the case in which these expressions are used." *Cohens* v. *Virginia,* 19 U.S.

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able problems are raised which only committees of Congress can manage * * *." (Emphasis added and footnote omitted.) However, "these programs" refers to the specific type of claimed program involved in *Benson* and not to computer programs in general, as clearly evidenced by the immediately preceding paragraphs of the *Benson* opinion (409 U.S. at 71–72, 93 S. Ct. at 257, 175 USPQ at 676–77):

"It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a 'different state or thing.' We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. It is said that the decision precludes a patent for any program servicing a computer. *We do not so hold* * * * What we come down to in a nutshell is the following.

"It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting [binary-coded decimal] numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.

"It may be that the patent laws should be extended to cover *these programs*, a policy matter to which we are not competent to speak. The President's Commission on the Patent System rejected the proposal that *these programs* be patentable * * *." [Emphasis added and footnotes omitted.]

(6 Wheat.) 264, 398, 5 L. Ed. 257 1821).[5] If, however, doubt should remain with respect to the solicitor's suggestion, we think it fully removed by the Supreme Court's unanimous characterization of its holding in *Benson* as "limited" in *Dann* v. *Johnston*, 425 U.S. 219, 224, 96 S. Ct. 1393, 47 L. Ed. 2d 692, 189 USPQ 257, 259 (1976).

The unique technological aspects of digital computers and the changes wrought in their operation by associated software programs, coupled with the limited number of precedential court decisions, illustrate the undersirability of deciding the issue of patentability by mere use of the label "computer program." We join the Supreme Court's suggestion in *Benson* that those who seek to preclude the patenting of all software or "computer program" inventions submit an appropriate proposal to the Congress. In the meantime, we must and will decide such cases of the law as we find it. In the present case we find no basis for treating methods of operating computing machine

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[5] Over-concentration on the word "algorithm" alone, for example, may mislead. The Supreme Court carefully supplied a definition of the particular algorithm before it, i.e., "[a] procedure for solving a given type of mathematical problem." The broader definition of algorithm is "a step-by-step procedure for solving a problem or accomplishing some end." *Webster's New Collegiate Dictionary* (1976). It is axiomatic that inventive minds seek and develop solutions to problems and step-by-step solutions often attain the status of patentable invention. It would be unnecessarily detrimental to our patent system to deny inventors patent protection on the *sole* ground that their contribution could be broadly termed an "algorithm."

systems differently from methods of operating any other form of machine system.

The issue before us is thus whether these *particular* claims define statutory subject matter.[6]

Analysis

[1] The statute, 35 U.S.C. § 101, provides that new and useful processes and improvements thereof are patentable subject matter. A "process" is defined in 35 U.S.C. § 100(b) as a "process, art or method, and includes a new use of a known process, machine, manufacture composition of matter, or material." Some inventions, however meritorious, do not constitute patentable subject matter, e.g., printed matter, *In re Miller* 418 F. 2d 1392, 57 CCPA 809, 164 USPQ 46 (1969); methods of doing business, *In re Wait,* 73 F. 2d 982, 22 CCPA 822, 24 USPQ 88 (1934); purely mental steps, *In re Prater,* 415 F. 2d 1393 56 CCPA 1381, 162 USPQ 541 (1969), *In re Musgrave* 431 F. 2d 882, 57 CCPA 1352, 167 USPQ 280 (1970); naturally occurring phenomena or laws of nature, *O'Reilly* v. *Morse,* 56 U.S. (15 How.) 62, 14 L. Ed. 601 (1853); a mathematical formula and the algorithm therefor, *Gottschalk* v. *Benson,* 409 U.S. 63, 93 S. Ct. 253, 34 L. Ed. 2d 273, 175 USPQ 673 (1972).

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[6] We are not unmindful of literature discussing broad public policy considerations involved in the question of software patent protection. See, e.g., Keeffe & Mahn, *Protecting Software: Is It Worth All The Trouble?*, 62 A.B.A.J. 906 (1976). We are limited, however, to determination of issues presented in specific cases. Though we decide the present case, as we must, in the light of our best understanding of the statute and prior decisions of the Supreme Court, we join our brother Rich's scholarly call for definitive guidance by higher authority.

[2] Because Chatfield's claim 1 defines the inventions as a "method of operating a computing system upon more than one processing program * * * comprising," the claim *prima facie* is directed to a "method" and the wording of the claim would bring it within the statutorily defined "process" category. However, a claim to a "method" or "process" may fall within the literal terms of the statute and yet not define proper subject matter for patent protection. *Benson* and *Christensen,* supra. The question is whether the claimed method falls within either of two categories judicially determined to be non-statutory, i.e., claims drawn to mathematical problem-solving algorithms or to purely mental steps. We hold that the present claims fall within neither.[1]

Chatfield's inventive contribution, as set forth in the appealed claims and described above, is a unique method for improving the operating efficiency of a system of electro-mechanical machines, i.e., a computing system. No formula or algorithm appears in Chatfield's independent claims. The dependent claims set forth a number of different algorithms which may be used in carrying out intermediate steps in the overall process of operating the computer system. We faced a similar situation in *In re Bernhart,* 417 F. 2d 1395, 57 CCPA 737, 163 USPQ 611 (1969). *Bernhart's* apparatus claims included a mathematical equation. The examiner contended that the point of patent-

[1] The "formula-algorithm" category is treated in the text. We have extensively reviewed the doctrine of "mental steps" in *In re Prater,* 415 F. 2d 1393, 56 CCPA 1381, 162 USPQ 541 (1969) and *In re Musgrave,* 431 F. 2d 882, 57 CCPA 1352, 167 USPQ 280 (1970), and find no need to repeat that analysis herein. It is enough to say that we find the claims herein to be limited to a method of operating a machine system.

ability of the invention lay in the equation itself, the remainder of the subject matter in the claims being admittedly old. Because the point of patentability was nonstatutory, the examiner argued, the claims failed to define statutory subject matter. The examiner referred to "mental steps," and the board referred to "printed matter" as the non-statutory subject matter. We found neither relevant. We did, however, consider the principle extracted by the examiner and the board from earlier "mental step" and "printed matter" cases to be as follows: "If, in an invention defined by a claim, the novelty is indicated by an expression which does not itself fit in a statutory class (in this case not a machine or a part thereof), then the whole invention is nonstatutory since all else in the claim is old." (417 F. 2d at 1399, 57 CCPA at 743, 163 USPQ at 615). In rejecting that view as incorrect, we said:

"We think it is clear that in enacting section 101 Congress meant to exclude principles or laws of nature and mathematics, of which equations are an example, from even temporary monopolization by patent. Accordingly, no rule of law should be announced which would impress a monopoly upon all uses of the equations disclosed by appellants here in their patent application. To allow the claims in issue here would not prohibit all uses of those equations. As we have pointed out above, a member of the public would have to do much more than use the equations to infringe any of these claims. He would have to use them in the physical equipment recited in the claim. Moreover, all machines function according to laws of physics which can be mathematically set forth if known. We cannot deny patents on machines merely because their novelty may be

explained in terms of such laws if we are to obey the mandate of Congress that a machine is subject matter for a patent. We should not penalize the inventor who makes his invention by discovering new and unobvious mathematical relationships which he then utilizes in a machine, as against the inventor who makes the *same machine* by trial and error and does not disclose the laws by which it operates. The mandate of Congress in 35 U.S.C. 103 is that 'patentability shall not be negatived by the manner in which the invention was made.' For the foregoing reasons, we conclude that under the statute the apparatus herein claimed constitutes statutory subject matter." [417 F. 2d at 1399–1400, 57 CCPA at 743–44, 163 USPQ at 616].

[3] We have thus specifically rejected the broad notion that if a portion of a claim be non-statutory the whole claim is ipso facto non-statutory. The requirement is that the invention set forth in a claim be construed as a whole.

In *In re Christensen,* 478 F. 2d 1392, 178 USPQ 35 (CCPA 1973), we were called upon to decide whether method claims reciting a mathematical equation defined statutory subject matter. The claims in *Christensen* defined the invention as a "method of determining the porosity of a subsurface formation in situ" by solving a particular equation. The invention comprised gathering data and using it to solve a particular equation. In affirming the rejection of the claims, we followed the tenet of *Benson* that solving an equation constituted non-statutory subject matter. We determined that the several steps antecedent to the solving of the equation in Christensen's claims merely established the variables for the equation and did not suffice to render the claimed

method patentable as a whole. Our reference in *Christensen* to the mathematical equation as being "at the point of novelty" does not equate to a holding that a claim may be dissected, the claim components searched in the prior art, and, if the only component found novel is outside the statutory classes of invention, the claim may be rejected under 35 U.S.C. § 101. That procedure is neither correct nor within the intent of Congress, for the reasons we stated in *Bernhart*.

[4] As above indicated, Chatfield's independent claims contain neither a mathematical formula nor a mathematical algorithm. Mathematical algorithms appear only in the dependent claims and do not themselves constitute the method per se. The dependent claims are drawn to several different mathematical formulae and algorithms and, conceivably, numerous other algorithms could be developed and used in the novel method. The dependent claims are not, of course, claims to the mathematical algorithms appearing therein but are claims to the method of independent claims in which the analysis steps are carried out by use of the specified algorithm. A patent issuing on Chatfield's claimed method would thus preempt neither the mathematical formulae nor the algorithms specified in such a patent, unless used in the performance of the entire claimed method. Such a patent would thus not be "in practical effect * * * a patent on the algorithm itself." See note 4, supra.

The appealed claims, analyzed as a whole, simply define a novel method for operating a particular machine system in a particular mode. The method is claimed in a series of discrete method steps of the type one might expect to find governing the operation of a system of non-computing machines, e.g., a milling machine system. The claimed process does not

end with solution of a particular equation, as in *Christensen.* Nor are the appealed claims so "abstract and sweeping" as those in *Benson,* being limited to the particular operation of a computing machine system as specified in the claims. Thus, the claimed method differs materially and significantly from the invention in either *Christensen* or *Benson.* We therefore are not persuaded to discount Chatfield's novel contribution to the useful arts as outside the field of endeavor intended to be encouraged by our patent laws.

The decision of the board is *reversed.*

REVERSED.

RICH, Judge, dissenting, with whom LANE, Judge, joins.

Are programs for general-purpose digital computers patentable subject matter under 35 U.S.C. § 101?

Such programs are "software" in the jargon of the computer technicians. More generally, therefore, the question is: can software ever be patented? It is a question of whether it falls within the statutory classes of patentable subject matter which are recited in § 101, which mentions neither programs nor software. The reason for this lacuna is clear and not unusual; the language of § 101 was developed long before computer technology evolved. The statute was, of course, written for the future and intended to encompass future inventions in unknown technologies or "useful arts," mentioned in Article 1, section 8 of the Constitution. See *In re Waldbaum,* 457 F. 2d 997, 59 CCPA 940, 173 USPQ 430 (1972), in which we held a program, claimed as method, to be statutory subject matter.

The categories of patentable inventions named in § 101 are an evolution from the first patent act of

1790 where they were named as "any useful art, manufacture, engine, machine, or device, or any improvement therein." The 1973 act changed it to "any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter." The 1836 act, which established the first Patent Office, retained the identical language. The Consolidated Patent Act of 1870 (§ 24) simplified it to "any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof," language which was repeated in the Revised Statutes of 1874 (§ 4886) and which remained the same until 1952. The only change in the wording made by the Patent Act of 1952—which was not a change in substance—was the replacing of the word "art" by the word "process" (§ 101) coupled with a new definition in § 100(b) stating: "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material," a mere modernization of language and a declaration of existing case law.[1]

It has never been otherwise than perfectly clear to those desiring patent protection on inventions which are new and useful programs for general purpose computers (software) that the only way it could be obtained would be to describe and claim (35 U.S.C. § 112) the invention as a "process" or a "machine." Method is the equivalent of process by statutory defi-

[1] I make this statement as a matter of personal knowledge as one of the drafters. Many lawyers have thought the definition added new patentable subject matter but that is not so. New uses *claimed in the form of process or method* had long been deemed patentable by the Patent Office and the courts. See *In re Waldbaum*, supra.

nition; apparatus is the equivalent of machine by long-established custom. Webster defines apparatus as including machinery. In patent law, machine and apparatus have for over a century been interchangeable words. See *Corning* v. *Burden,* 56 U.S. 252, 267, 14 L. Ed. 683 (1853); *In re Prater,* 415 F. 2d 1393, n. 11, 56 CCPA 1381, n. 11, 162 USPQ 541, n. 11 (1969). As I have previously said in my dissenting opinion in *In re Johnston,* 502 F. 2d 765, 772, 183 USPQ 172, 178 (1974), given an invention which is in essence a new program for a general-purpose digital computer, a competent patent draftsman can readily define the invention as either a process or a machine, or both. This has been demonstrated time and again by the computer program cases which have come to this court.

In the first such case, *In re Prater,* supra, we had both process or method and apparatus or machine claims. It was in that case that we stated an incontrovertible fact and a principle of patent law which, until recently, we have consistently since followed, to the effect that a new program makes an old computer into a new machine, as follows:

> In one sense, a general-purpose digital computer may be regarded as but a storeroom of parts and/or electrical components. But once a program has been introduced, the general-purpose digital computer becomes *a special-purpose digital computer* (i.e., a specific electrical circuit with or without electro-mechanical components) which, along with the *process* by which it operates, may be patented subject, of course, to the requirements of novelty, utility, and non-obviousness. *Based on the present law, we see no other reasonable conclusion.* [Footnote 29. Emphasis mine.]

We applied that principle in a long line of cases that came to us as a result of the policy of the Patent Office to deny patentability to program inventions on the ground of non-statutory subject matter—and on any other ground it could find.

Finally, we came to the two software cases in which our decisions were reviewed by the Supreme Court, *In re Benson,* 441 F. 2d 682, 58 CCPA 1134, 169 USPQ 548 (1971), *rev'd., Gottschalk* v. *Benson,* 409 U.S. 63, 93 S. Ct. 253, 34 L. Ed. 2d 273, 175 USPQ 673 (1972); and *In re Johnston,* 502 F. 2d 765, 183 USPQ 172 (1974), *rev'd., Dann* v. *Johnston,* 425 U.S. 219, 96 S. Ct. 1393, 47 L. Ed. 2d 692, 189 USPQ 257 (1976). *Benson* involved two *method* claims and the sole question was whether they were directed to non-statutory subject matter. *Johnston* involved five *apparatus* claims directed to "machine systems." Johnston sought to distinguish his case from *Gottschalk* v. *Benson* on the ground that Benson's claims were for process and his were for apparatus, which is no distinction at all in the computer program field because of the option the specification writer has to cast the claims in either format. Johnston persuaded a majority of this court to his point of view. I dissented on the point, saying:

> I conclude that the *Benson* decision requires us to affirm the rejection of claims 20–24 as directed to non-patentable subject matter under 35 U.S.C. § 101.

In the present case and in *In re Noll,* decided concurrently, a differently constituted majority of this court is again finding computer program inventions to be subject matter which is patentable within the contemplation of § 101, notwithstanding the Supreme

Court's *Benson* opinion. Clearly the reason for this is that the *Benson* opinion is open to different interpretations with respect to the patentability of software. That should have been obvious from the division in this court which occurred in *Johnston,* yet nothing was said in *Dann* v. *Johnston* to clear up the ambiguity because the Court avoided discussing the § 101 patentable *subject-matter* issue which was before it, preferring to reverse this court on the single ground of § 103 obviousness. The seven justices participating in the unanimous opinion said in its second paragraph:

> Petitioner and respondent, as well as various *amici,* have presented lengthy arguments addressed to the question of the general patentability of computer programs. Cf. *Gottschalk* v. *Benson,* 409 U.S. 63, 93 S. Ct. 253, 34 L. Ed. 2d 273 (1972). *We find no need to treat that question in this case,* however, because we conclude that in any event respondent's system is unpatentable on grounds of obviousness. 35 U.S.C. § 103. [Emphasis mine.]

The Court did not leave the statutory subject matter question strictly alone, however, because, in reciting the background of the issues (Part II of opinion) and the decisions below, the Court thus characterized its *Benson* decision:

> In *Benson,* the respondent sought to patent as a "new and useful process," 35 U.S.C. § 101, "a method of programming a general-purpose digital computer to convert signals from binary-coded decimal form into pure binary form." 409 U.S., at 65, 93 S. Ct. at 254, 34 L. Ed. 2d at 276. As we observed, "[t]he claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use." *Id.,* at 64, 93 S. Ct. at 254, 34 L. Ed. 2d at 275. Our limited holding,

> *id,* at 71, 93 S. Ct. at 257, 34 L. Ed. 2d at 279, was that respondent's method was not a patentable "process" as that term is defined in 35 U.S.C. § 100(b).

That brief observation adds considerably to the already existing ambiguity inherent in the *Benson* opinion. Does it say Benson's two claims were held *non-statutory* only *because* they were not limited to any particular technology, apparatus, or end use?

Does the Supreme Court not regard data processing as a technology, data-processing equipment as apparatus, or the necessary conversion in such apparatus of binary-coded-decimal to pure binary signals as an end use?

The answers to these questions are very important because in the instant case, and in *In re Noll,* the invention relates only to the operation of data-processing equipment ("computers") without reference to any other "technology," "apparatus," or "end use." How, then, can this case be distinguished from *Benson* even when the narrowest possible view of that decision is taken? Just how "limited" was the holding in *Benson* supposed to be? Benson's claims were in fact limited to a method carried out in data-processing apparatus (including a "reentrant shift register," claim 8) and to "A data processing method" (claim 13). Benson did not claim a "formula."

In the *Benson* opinion, the Court states at the outset that "The question is whether the method described and claimed is a 'process' within the meaning of the Patent Act." (Sections 101 and 100(b) were quoted in a footnote to that statement.) But nowhere in the *Benson* opinion have I ever, after many attempts, been able to find an express answer to that question, for which reason, as more fully explained in my dissent-

ing opinion in *Johnston,* supra, I have turned to the competing contentions which were presented to the Supreme Court in *Benson,* to its *decision* that we erred in holding the claims statutory, which was our *only* holding, and have concluded that the members of the Court participating in that decision were unanimous in holding that programs for general-purpose digital computers, at least when claimed as a "process," are not within the meaning of that category of inventions in the statute. It is my own view that claiming as a "machine" instead of as a "process" is no distinction at all because it is merely a drafter's choice.

My colleagues of the majority take a narrower view of *Benson* and arrive at an opposite result in these two new cases, as another majority did in *Johnston.* This, to me, signals an urgent need to settle the question of patent protection for software by higher authority than this court so that the Patent and Trademark Office, the Federal judiciary as a whole, and the data-processing industry (hardware and software both) may know what the law on software patentability is. It is a socioeconomic issue with an impact of considerable magnitude, particularly on the practical operation of the Patent and Trademark Office. It is obviously not going to be finally decided in this court. Two Commissioners (Gottschalk and Dann) have obtained review of our decisions in the Supreme Court and in both instances (*Benson* and *Johnston*) obtained reversals; but here we are in two more cases, three-to-two, reversing findings by the Office that program inventions are non-statutory under § 101. It seems to me like taking the problem of school segregation to court on a case-by-case basis, one school at a time.

APPENDIX B

[Solicitor, December 13, 1976, U.S. Patent Office]
United States Court of Customs and Patent Appeals

Mandate No. 76-551

In the matter of the application of Glen F. Chatfield, Serial No. 243,951.

On appeal from the Board of Appeals. This cause having been heard and considered, it is ordered and adjudged: Reversed.

Dated November 18, 1976.

A true copy.

Test:

By George E. Hutchinson
GEORGE E. HUTCHINSON,
Clerk, United States Court of Customs and Patents Appeals.

Certified this 10th day of December 1976.

APPENDIX C

Opinion and Decision of Board of Appeals, June 19, 1975

Paper No. 11

Before SEROTA and BENNETT, Examiners-in-Chief, and LINDQUIST, Acting Examiner-in-Chief

BENNETT, Examiner-in-Chief: This is an appeal from the final rejection of claims 1 through 6 and 9 through 16.

Claim 1 is reproduced below:

1. A method of operating a computing system upon more than one processing program concurrently for improving total resource utilization, said computing system comprising at least one central processing unit, having a logic and main memory function and an interrupt capability and a plurality of peripheral resources capable of functioning in parallel with the central processing unit, comprising steps for:

(1) accumulating system utilization data for at least one processing program for at least one resource, said system utilization data comprising resource activity and/or resource degradation data;

[94] (2)(a) at spaced intervals interrupting the processing programs and analyzing the system utilization of at least one processing program;

(2)(b) based on this analysis regulating resource access by assigning an individual resource access priority and/or preventing resource access altogether in an unlike manner to at least one processing program to increase thruput;

(3) resuming the operating of the computing systems on the processing programs; and,

(4) continually repeating steps (1) to (3).

No references have been relied on by the examiner.

The invention relates to a method for improving the operation of a digital computer by processing several programs concurrently while utilizing peripheral resources with maximum efficiency.

Claims 1 through 6, and 9 through 16 stand rejected under 35 U.S.C. 101; "as directed towards non-statutory subject matter." The basis for the examiner's decision is *Gottschalk* v. *Benson* and *In re Christensen*, a later decision of the Court of Customs and Patent Appeals. In the main body of our opinion we have discussed *In re Benson*, the decision of the Court of Customs and Patent Appeals which was ultimately reversed by the Supreme Court. In addition, we have discussed *In re Musgrave* which preceded *In re Benson*.

[95] The citations of these precedents are presented below:

> *Benson-Gottschalk* v. *Benson*, 409 U.S. 63, 175 USPQ 673 (1972).
> *In re Benson*—58 CCPA 1134, 441 F. 2d 682, 169 USPQ 548 (1971).
> *In re Christensen*—478 F. 2d 1392, 178 USPQ 35 (CCPA 1973).
> *In re Musgrave*—57 CCPA 1352, 431 F. 2d 882, 167 USPQ 280 (1970).

The subject matter before us relates to a method of operating a computing system including a general purpose computer digital by means of a computer program. The program itself is the heart of the disclosure and a basic version of it is to be found in Appendix A following the original claims. The task of this program is to regulate the access that each

of several processing programs have to the peripheral resources of the computing system such as input/output channels. The regulation is dynamic in that it takes place while the computer executes its processing programs. Data is gathered which reveals the extent to which each resource (an input device for example) is used by each of several processing programs. The data is analyzed for a brief interval while regular data processing is suspended and then resource access priority is assigned by the regulating program. Control of the computer operation is obtained from the processing programs at spaced intervals. Even though valuable central processing time, [96] as well as central processor memory space is taken by the regulating program of the invention there is allegedly a net gain in efficiency for the overall computing system.

The program disclosed is designed to co-act with the commercially available general purpose IBM System 360/370 computer. The basic program is commercially available but must be modified in accordance with the flow charts presented in this application in order to carry out the method claimed.

Appellant argues that methods of operating electrical and mechanical equipment have long been considered to be statutory subject matter. Appellant contends that the method relates to a plurality of steps to improve the operation of a computing system. It is argued that the method should be considered no different than a process for increasing the yield of a screw machine, an open hearth furnace, or an oil refinery.

Appellant emphasizes that his claims are limited to a particular type of apparatus and to a particular end use and hence they are different from the claims before the Supreme Court in Benson.

We fail to see the distinction. Appellant implements his invention on a general purpose computer, as was the case in Benson. The end use, data processing, is the same.

[97] It is helpful in understanding the Benson opinion to look briefly at the lower court decision, In re Benson, that generated the request for certiorari, and also at In re Musgrave that preceded it by a few months.

In Musgrave, the lower court had before it a method of seismic exploration. Some of the steps of the method were alleged to be "non-statutory". The Court said:

> All that is necessary, in our view, to make a sequence of operational steps a statutory "process" within 35 USC 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of "useful arts" Const. Art. 1, sec. 8.

The invention In re Benson was different from that in In re Musgrave. The Court (CCPA) recognized this fact and said:

> The claims in this case are directed solely to the art of data-processing itself whereas in * * * [Musgrave * * * additional art was involved.

The Court said in addition:

> * * * the process * * * has no practical use other than the more effective operation and utilization of a machine known as a digital computer. It seems beyond question that the machines—the computers—are in the technological field,, are in part one of our best-known technologies, and are in the "useful arts" rather than the "liberal arts", as are all other types

> of "business machines," [98] regardless of the uses to which their users may put them. How can it be said that a process having no practical value other than enhancing the internal operation of those machines is not likewise in the technological or useful arts?

It should be apparent from the above quotation that appellant in arguing that his method improves the operation of a computer is making an argument which is similar to the CCPA rational quoted above.

The Supreme Court granted a petition for a writ of certiorari and then reversed the lower court's decision. They also, in our opinion, cast aside the reason of the court below.

The Supreme Court characterized the invention as "a method of programming a general purpose computer" and found the claims objectionable because they were not limited to any particular art or technology.

We do not consider In re Christensen to be directly in point and so we will not discuss it.

The invention before us, as was the invention before the Court in Benson, is a method of programming a general purpose computer. Such inventions are not patentable under 35 USC 101.

[99] We sustain the examiner's rejection. The decision of the examiner is affirmed.

Affirmed.

SAUL I. SEROTA,
Examiner-in-Chief,
R. D. BENNETT,
Examiner-in-Chief,
WILLIAM F. LINDQUIST,
Examiner-in-Chief, (Acting),
Board of Appeals.

U.S. GOVERNMENT PRINTING OFFICE: 1977